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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/892,878	06/28/2001	Jun Dong Kim	08245.0027	3043

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FINNEGAN, HENDERSON, FARABOW, GARRETT &
DUNNER LLP
1300 I STREET, NW
WASHINGTON, DC 20005

EXAMINER

RAO, SHRINIVAS H

ART UNIT PAPER NUMBER

2814

DATE MAILED: 06/20/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/892,878

Applicant(s)

KIM ET AL.

Examiner

Steven H. Rao

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 June 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 June 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Priority

Receipt is acknowledged of paper submitted under 35 U.S.C. 119(a)-(d), claiming priority from Korean Patent Application No. 2000- 36495 filed June 29, 2000 which papers have been placed of record in the file.

Drawings

The drawings filed on June 28, 2001 have been accepted.

Claim Rejections - 35 USC § 112

Claims 6-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention

In claim 6 the phrase "material layer" renders the claim indefinite because the term "material layer " can mean anything and further the specification, prosecution history, prior art or one skilled in the art would be unable to determine what Applicants' intend to include or exclude by their recitation of the phrase, " material layer".

It is suggested that "material layer " be deleted.

Claims 7-10 are rejected at least for depending upon a rejected claim 6.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ye et al. (U.S. Patent No. 6,080,529, herein after Ye). In view of Lau et al. (U.S. Patent No. 5,173,542, herein after Lau).

With respect to claim 1, Ye describes a method of forming gate electrodes of a semiconductor device including the steps of : forming a gate insulation layer over the semiconductor wafer (Ye col. 11 lines 36-38, silicon dioxide layer not shown in the drawings), forming a conductive layer over the gate insulation layer (Ye fig. 2a # 216, col. 11 line 41), forming a low-dielectric layer over the conductive layer (Ye fig. 2A # 218, col. 11 line 42), forming a photo resist pattern whose width is equal to the exposure limit on the low dielectric layer (Ye layer 224 or 324, col. 21 lines 55-65, col. 22 lines 1-2 , col. 6 lines 5-21, especially line 18), patterning the low dielectric layer using the photo resist pattern as a mask (Fig. 2c , col. 6 lines 9- 18, col. 12 lines 28-32), removing photo resist pattern (col.11 lines 33-34), shrinking the low dielectric pattern.

Ye does not specifically mention shrinking the low dielectric pattern.

However, Lau, a patent from the same filed of endeavor (both Ye and Lau deal low dielectric layers made from organic polymers Including PTFE, etc. see claim 3 of Ye and col. 1 lines 20-37 of Lau) describes the standard procedure of the shrinking the low-dielectric pattern by curing the low-dielectric pattern (Lau in col.14 line 37 and claim 11 © curing) to cross link the polymers.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to include Lau's curing (i.e. shrinking of dielectric) step in Ye's method steps to cross-link the polymer of the low dielectric layer . (Lau col. 1 lines 49-61).

Forming gate electrodes by patterning the conductive layer and the gate insulation layer using the shrunken low dielectric layer pattern as a mask (Figs. 3D and 2 B, col. 11 lines 66- col. 12 lines 32, col. 15 lines 6-10). (it is noted that Ye teaches at least two separate embodiments in figs. 2A—G and 3 A-G, however Ye in at least col. 15 lines 5-8 teaches the steps of embodiments in figs. 2 and 3 are interchangeably used).

With respect to claim 2 wherein the low-dielectric layer is formed of an organic spin-on glass or inorganic spin-on glass layer. (Ye col. 6 lines 22-26-organic low k dielectric materials and col. 14 line 65-66 glass-like siloxane) .

With respect to claim 3 wherein the forming of the low –dielectric layer comprises : depositing low dielectric layer over the conductive layer for the gate electrodes (fig.2 G # 230, col. 13 lines 55-60) and soft –baking the low-dielectric layer at a predetermined temperature .

Ye does not specifically describe soft-baking its low-dielectric layer at a predetermined temperature.

However, Lau, a patent from the same filed of endeavor describes in col. 14 line 35 the standard procedure of soft –baking the low dielectric is soft baked after its application to drive off any remaining solvents from the mixture applied.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to include Lau standard " soft-baking step in Ye's method to remove any excess liquid remaining after the application of the dielectric polymer mixture on the wafer. (Lau col.14 Line 36).

With respect to claim 4, wherein the shrinking the low-dielectric pattern by curing the low-dielectric pattern at 400-500 degrees centigrade. (Lau in col.14 line 37 and claim 11 © curing at 300-450 degrees to cross link the polymers). Therefore it would have been obvious to curing between 400-500 degrees without more because it was previously done in the overlapping range of 300-450 degrees.

With respect to claim 5, wherein removing the photo resist pattern and shrinking are performed at the same time. (Ye in col. 4 lines 21-29 and col. 11 lines 1-7describes the process of removing the photo resist pattern using temperature between 150-350 degrees centigrade which temperature falls within the standard soft-temperature of 100-200 (Lau col. 14 line 36) therefore Ye's step of removing the photo resist will also result in the soft bake of the wafer).

With respect to claim 6, to the extent understood, it recites the same steps as claim 1 except for reciting, " a material layer" instead of a "conductive layer " in claim 1 and rejected for the same reasons as stated above under claim 1 . (It is noted that the sequence of performing the process steps is slightly changed in claim 6, however as well settled case law (Exparte Rubin and In re Burhaus , any order of performing steps is prima facie obvious in absence of new or unexpected results).

Claims 7-10 repeat the same steps of claims 2-5 and are rejected for reasons stated above.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven H. Rao whose telephone number is (703) 3065945. The examiner can normally be reached on 8.00 to 5.00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chaudhuri Olik can be reached on (703)3062794. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 7463926 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 3067722.



Steven H. Rao

Patent Examiner

June 15, 2002



OLIK CHAUDHURI
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800